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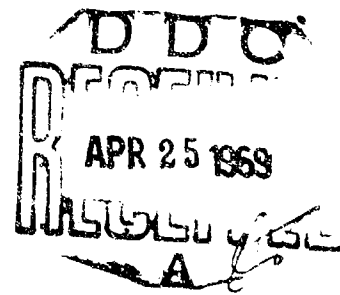# FACTORIALLY DERIVED INFORMATION MEASURES FOR DIFFERENTIAL PREDICTION OF OFFICER PERFORMANCE

BEHAVIORAL EVALUATION RESEARCH DIVISION

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Behavioral Science Research Laboratory

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FACTORIALLY DERIVED INFORMATION MEASURES FOR DIFFERENTIAL PREDICTION OF OFFICER PERFORMANCE

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Officer Prediction d-41

BEHAVIORAL SCIENCE RESEARCH LABORATORY

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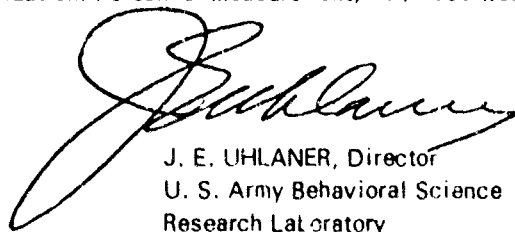
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FOREWORD

The mission of the OFFICER PREDICTION Work Unit is to develop improved means of assigning officers who have aptitudes and other characteristics to meet the differing demands of different officer activities.

The research program consists of the development of psychological tests and techniques and the evaluation of the measures as differential predictors of performance in combat, technical, and administrative duties. In 1958 and again in 1962, experimental tests for the Differential Officer Battery were administered to Regular Army and Reserve officers entering on active duty, numbering more than 10,000. The experimental predictors are being evaluated as predictors of success as measured by several methods. Ratings by superiors and peers were accomplished after about one year of active duty. In 1964 1965, a series of situational tests in which the officer is confronted with problems typical of service under combat conditions in each of the three areas was administered to 900 officers previously tested with the experimental battery. The exercise was staged at the Officer Evaluation Center established for the purpose at Fort McClellan, Alabama. In 1967 and 1968, evaluations of performance in combat (Vietnam) and in combat-ready situations (Europe, Korea, CONUS) were obtained.

Analyses now being completed are concerned chiefly with means of scoring the predictor instruments. The present Technical Research Note details the analysis of officer responses and formulation of scoring scales for the information tests of the battery.

The entire research work unit is responsive to special requirements of the Deputy Chief of Staff for Personnel as well as to requirements of RDT&E Project 2J062106A722, "Selection and Behavioral Evaluation: Personnel Measurement," FY 1969 Work Program.

J. E. UHLANER, Director
U. S. Army Behavioral Science
Research Laboratory

FACTORIALLY DERIVED INFORMATION MEASURES FOR DIFFERENTIAL PREDICTION OF OFFICER PERFORMANCE

BRIEF

Requirement:

Development of scoring formulas for many of the experimental predictors of the Differential Officer Battery requires detailed and complex analysis of officer responses. These analyses, while time-consuming, are an essential step toward the end product-- psychological measures that are usefully discriminative for assignment of officers to combat, technical, and administrative duties.

Procedure:

Analysis of the information test in the battery took the unusual form of a double analysis--each analysis based on half the questions--and a synthesis of the results. Two equivalent sets of questions were formed from the 600 information questions in the battery. The officer sample for both analyses consisted of 900 officers who took the test at entry on active duty, 100 being randomly selected from each of nine branches of service. In each analysis, officer responses were grouped on the basis of interrelationships (factor-analyzed) to define relatively independent areas of information. Matching areas defined in the two parallel studies were identified for scoring purposes. Questions not belonging in the matched areas were assembled on the basis of content into 13 additional sets.

Findings:

Ten areas of information were matched in the two separate analyses:

Practical skills	Entertainment - culture
Technology operations	Finance
Math - physical science	Organized sports
History - politics	Intellectual games
Literature - arts	Biochemistry

Utilization of Findings:

All 23 scores formulated as a result of the analyses will be evaluated as predictors of officer performance as determined by 1) ratings after one year of active duty, 2) performance in a simulated combat exercise conducted at the Officer Evaluation Center, and 3) 1967-68 ratings obtained in the field, either in combat in Vietnam or in combat-ready situations (Europe, Korea, CONUS). The studies will demonstrate to what extent scores on the several information areas are differentially predictive of officer effectiveness in combat, technical, and administrative assignments. Basing scores on a double analysis should reduce the effect of chance results in evaluating the prediction achieved.

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FACTORIALLY DERIVED INFORMATION MEASURES FOR DIFFERENTIAL PREDICTION OF OFFICER PERFORMANCE

BACKGROUND

The research reported here is part of a comprehensive longitudinal program to predict officer performance by psychological measures obtained at entry on active duty. In 1959 and again in 1960, large samples of officers took an extensive battery of measures of officer leadership potential. These measures were designed to evaluate qualities important in military leadership in any area--the "generalist" concept--and qualities relevant to performance in each of three broad areas--combat, technical, and administrative. The 1960 input of 4000 officers, from which the present sample was drawn, took a two-day battery of measures called the Differential Officer Battery (DOB) at the beginning of attendance at Branch Basic Officer courses. About one year later, their job performance and potential were evaluated by supervisors and colleagues working closely with them. Some six months later, officers in a selected sample were evaluated in a three-day integrated exercise simulating performance of combat, technical, and administrative duties in a combat situation staged at the Officer Evaluation Center specially instituted for the evaluations. Finally, in the period from Spring 1967 to Spring 1969, those members of the original 4000-man sample who were still on active duty were rated on job performance in a combat theater (Vietnam) or in combat-ready situations in Europe, Korea, or CONUS.

Design of Overall Study

The basic design for the comprehensive study consists of 1) analysis of the predictor battery to yield scores that are relatively homogeneous and independent, 2) validation of these scores as predictors of three measures of officer effectiveness--first-year ratings, performance in a simulated combat situation, and final job-performance ratings, and 3) criterion comparison and equivalence analyses. The present report covers the first step in analysis of the predictor battery--internal analysis of the information tests to define the scores to be obtained.

OBJECTIVES

The primary objective was to obtain relatively homogeneous item clusters for assembling into scales to be validated for all criteria. In addition, the comprehensive data afforded an opportunity for an empirical test of the usefulness of factor analysis of item interrelations as a technique for developing homogeneous scoring scales. Since the information measures contained 1 multiple-choice items covering 15 different content areas, it was practicable to divide the analysis into

two equivalent parts with 300 items in each. In this way, the factors and scales obtained from the two analyses could be compared and the stability of factor structure across th two analyses could be assessed. Thus, a second objective was to assess the extent of factor congruence in two samples of item content.

METHOD

Sample for Analysis

The analysis was designed to reveal psychological factors across all branches of service. Therefore, the sample was selected to afford adequate representation of all branches rather than the proportions found in the input population. There were nine branch basic courses: Infantry, Armor, Artillery, Engineer, Signal, Ordnance, Quartermaster, Adjutant General, and Finance. From each of these, 100 cases were randomly selected to compose the analysis sample of 900. In general, the first three could be considered to represent combat, the next three technical, and the last three administrative specialties.

Variables

The DOB contained four information tests of 150 items each. The 300 odd-numbered items constituted the set of variables for one analysis, the even-numbered items the set for the other analysis. The number of items in each set belonging to each content category is shown in Table 1.

Analysis Procedure

Steps in the analysis were as follows:

1. Correct response p-values were obtained for all items. Those with extreme values--less than .10 or greater than .90--were excluded from further analysis.

2. All retained items were intercorrelated (tetrachoric r). There were 290 items in each matrix.

3. Each matrix was factored by the principal axes method, using the highest off-diagonal entry as the communality estimate.

4. After inspection of the eigen values, the first 17 factors were rotated to simple structure by the varimax method.

5. Factor clusters were assembled, each item being placed in the cluster for which it showed the highest loading.

6. The clusters were refined to provide scales of 20 items where possible. Items with higher loadings in a given factor and negligible loadings on all other factors were given preference in selection for a scale.

Table 1

CONTENT CATEGORIES REPRESENTED IN DOB INFORMATION TESTS

Category	Number of Items		
	Odd	Even	Total
Combat Tactics	25	25	50
Organized Sports	15	14	29
Nature Sports	7	8	15
Farm Facts	9	9	18
Biology-Medicine	10	9	19
Psychology-Psychiatry	9	10	19
Technical Service Hardware	25	25	50
Mechanical Information	13	12	25
Physics	8	9	17
Chemistry	8	8	16
History and Philosophy of Science	8	7	15
Mathematics	13	14	27
Supply, Warehousing	25	25	50
Games	8	8	16
Art	9	9	18
Music	8	8	16
Entertainment	9	9	18
Literature	16	16	32
Finance	28	27	55
World Affairs, Politics	15	16	31
Socioeconomic Facts	11	11	22
Quantitative Miscellany	8	8	16
Qualitative Miscellany	13	13	26

Identification of Factors

The proportions of total variance included in each of the 17 rotated factors in each analysis are shown in Table 2. It will be remembered that the analysis was based on item intercorrelations, which tend to be moderate in size because of modest single-item reliability. Not every factor provided enough items with highest loadings to yield a usable scale.[1] Furthermore, clusters of items were identified in which there were substantial loadings on two factors. Even though such clusters could not provide relatively independent scales, they promised reasonable homogeneity, and the segregation of their items from the clusters with unique loadings on one or the other of the two factors improved the homogeneity of scales based on the unique clusters. The result was the identification of 14 usable factor scales in each analysis. Analysis of the odd-numbered items yielded 13 reasonably unique one-factor scales and one scale of items loaded on factors I and IV. Analysis of even-numbered items yielded 12 one-factor scales plus factor I-IV and factor II-V combinations.

Table 2

PERCENT OF TOTAL VARIANCE ACCOUNTED FOR BY
17 FACTORS IN EACH SAMPLE

Factor	Percent of Variance	
	Odd	Even
I	3.66	4.25
II	2.46	2.97
III	2.72	2.65
IV	4.55	2.75
V	1.60	1.86
VI	1.98	1.77
VII	1.49	0.97
VIII	0.91	1.00
IX	1.01	1.05
X	0.90	0.96
XI	0.84	0.92
XII	0.85	0.85
XIII	0.93	0.88
XIV	0.85	0.87
XV	1.65	0.84
XVI	0.91	0.82
XVII	0.91	0.81
Total	28.22	26.32

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[1] Factor VII in the odd set had only 5 items, factor VII in the even set only 3. These factors were retained because of the very high loadings (odd, .64 to .77; even, .71 to .73).

Matching Odd and Even Factors

   Factors derived from analysis of the odd- and of the even-numbered
information items were compared on the basis of number of items from
each content category. Table 3 presents the tabulation of number of
items in each content category for the matched factors. Thus, odd
factor I (I_o) has 20 items across six categories, and matched even
factor IV (IV_e) has 20 items across five of these same categories. It
was clearly revealed that odd factor I matched even factor IV, that odd
factor IV matched even factor I, and that the I-IV combination factors
were matched. In addition, factors II, III, and V through VIII matched
their respective number. in the other set, and odd factor XV matched the
even II-V combination. Partial matching was achieved between odd XIV
and even IX, and between odd XIII and even XIV. Only two factors from
each set failed to match by this comparison.

   Table 4 shows the percentage of items from each content category in
the matched factors and affords a ready basis for interpretation of the
factor scales. The table also suggests to some extent the content rela-
tionships among factors I and IV and the combination scale, and among
factors II and V and the combination scale. The latter scale emerged as
a separate factor XV in the odd set. The broad interpretations of the
scales are as follows:

Odd	Even	
I	IV	Practical knowledge, rural-mechanical
I-IV	I-IV	Mechanical and physical science knowledge
IV	I	Physical sciences and mathematics
II	II	Humanities, social science
XV	II-V	Entertainment, arts
V	V	Aesthetics
III	III	Finance
VI	VI	Organized sports
VII	VII	Intellectual games
VIII	VIII	Biology, chemistry
XIV	IX	Military tactics, technical services
XIII	XIV	Supply

Table 3

CONTENT CATEGORIES REPRESENTED IN DOB INFORMATION FACTORS

Category	I_O	IV_E
Nature Sports	4	5
Farm Facts	7	3
Biology-Medicine	3	0
Tech Svc Hardware	2	4
Mech Information	2	6
Other	2	2

Category	II_O	II_E
Art	2	2
Music	0	3
Entertainment	0	2
Literature	5	1
Politics	5	5
Socioeconomic	1	4
Other	3	3

Category	VI_O	VI_E
Organized Sport	12	11
Other	0	0

Category	$XIII_O$	XIV_E
Supply and Whsg	5	4
Politics	2	0
Other	4	4

Category	$I-IV_O$	$I-IV_E$
Farm Facts	0	2
Tech Svc Hardware	5	2
Mech Information	6	5
Physics	2	3
Chemistry	3	0
Other	4	3

	III_O	III_E
Finance	17	18
Other	3	2

Category	VII_O	VII_E
Games	5	3
Other	0	0

Category	XIV_O	IX_E
Tactics	4	3
Tech Svc Hardware	2	1
Supply and Whsg	0	2
Games	0	2
Other	4	2

Category	IV_O	I_E
Tactics	1	2
Tech Svc Hardware	1	2
Physics	4	4
Chemistry	4	3
Mathematics	10	9
Other	0	0

Category	V_O	V_E
Psycho-Psychiat	0	2
Tech Svc Hardware	1	2
Art	4	3
Music	3	1
Literature	6	5
Finance	1	2
Socioeconomic	2	1
Other	3	4

Category	$VIII_O$	$VIII_E$
Biology-Medicine	4	3
Chemistry	1	4
Politics	0	2
Other	3	1

Category	XV_O	$II-V_E$
Hist & Phil of Science	0	2
Music	4	2
Entertainment	7	3
Literature	2	3
Other	7	2

Unmatched Factors[a]

Category	IX_O	$XIII_E$	$XVII_O$	X_E
Psychology-Psychiatry	0	0	1	1
Technical Service Hardware	3	1	1	1
Mechanical Information	1	0	2	0
History and Philosophy of Science	0	0	0	1
Supply and Warehousing	1	1	1	1
Finance	1	0	0	0
Other	4	1	1	1

[a] Total of 2 or more items across all four factors.

Table 4

PERCENTAGES OF ITEMS FROM CONTENT CATEGORIES INCLUDED IN MATCHED FACTORS FROM ODD- AND EVEN-ITEM DATA

Content Categories	Odd Factor	Even Factors		
	I	IV	I-IV	I
Nature sports, farm facts	55ᵃ	40	10	0
Tech svc hardware, mech information	35	50	35	10
	I-IV			
Tech svc hardware, mech information	55	50	35	10
Physics, Chemistry	25	0	15	35
	IV			
Physics, Chemistry	40	0	15	35
Mathematics	50	0	0	45
	II	II	V	II-V
Art, Literature	35	15	40	25
Politics, Socioeconomic	50	45	5	0
	V			
Art, Music	35	25	20	17
Literature	30	5	25	25
	XV			
Music, Entertainment	55	25	10	42
Literature	10	5	25	25
	III	III		
Finance	85	90		
	VI	VI		
Organized Sport	100	100		
	VII	VII		
Games	100	100		
	VIII	VIII		
Biology-Med, Chemistry	62	70		
	XIV	IX		
Tactics, Tech svc hardware	60	60		
	XIII	XIV		
Supply and Warehousing	45	50		

ᵃUnderlined values (percentages) are for matched factors.

Correlation among Factor Scales

A more precise test of whether the same factors are found in the two analyses is of course the correlation between matched factors based on subjects' scores on the two scales. The correlation coefficients, providing estimates c reliability, are shown in Table 5. These coefficients between independently determined scales would be expected to be lower than reliability estimates based on odd-even assemblies in a consecutive

sequence. To provide comparable estimates, the reliability per unit length (that is, for a single item) is presented, as well as the reliability estimate for the combined pair of scales. It is evident that most correlation coefficients for the combined scales are in the acceptable range of reliability for tests of the given length.

Table 5

CORRELATION BETWEEN MATCHED ODD-EVEN FACTOR SCALES

Odd Factor	No. of Items	Even Factor	No. of Items	Correlation Coefficients[a]	Reliability	
					Single Item[a]	Scale[a]
I	20	IV	20	660	088	79
I-. '	20	I-IV	15	757	151	86
IV	20	I	20	795	162	89
II	20	II	20	668	091	80
V	20	V	20	506	049	67
XV	20	II-V	12	477	054	66
III	20	III	20	782	152	89
VI	12	VI	11	624	126	76
VII	5	VII	3	215	064	37
VIII	8	VIII	10	426	074	60
XIV	10	IX	15	282	030	44
XIII	12	XIV	8	152	018	26

Matched Odd-Even Residual Content Scales

Tactics	15	Tactics	15	196	016	33
Supply	15	Supply	14	333	033	50

[a] Decimal points omitted.

All items not included in the factor scales were assembled into residual content scales, all items from one content category being placed in a single scale. There were enough residual items in two categories-- Tactics and Supply--to provide both odd and even scales. Correlation within these pairs is shown for comparison with correlation between matched factor scales. It is evident that the unit reliability coefficients for these residual content scales are equivalent to those for the partially matched factor scales--the last two listed. From the data in Table 5, the decision was made to use the first ten factor scales for scoring and to relegate the items of the last two to residual content scales, obtaining in all 17 scales. Hereafter, factors XIV_o, IX_e, $XIII_o$, and XIV_e are treated as unmatched factors.

Independence among Factor Scales

Table 6 presents the estimated correlation among the ten accepted
scales from each analysis, obtained by averaging the correlation coeffi-
cients of each pair member with a given pair. (Note that these are not
estimates of correlation among the full-length combined scales.) Except
for the expected correlation between the scales based on items with
loadings on two factors--the I-IV and II-V scales--only the factor VIII
scales show appreciable correlation with others--the I-IV set and factor
scale II. Correlation with the unmatched factors was also low, except
for XIV_o and IX_e, which correlated moderately with the same four scales
as factor VIII.

Table 7 presents correlation coefficients between the ten selected
scales and all residual content scales. All but a few of the moderate-
size coefficients are found between content scales and factor scales
with five or more items from the same content category.

Table 6

CORRELATIONS[a] AMONG FACTOR SCALES (ODD-EVEN AVERAGED)

						Factor Scales[b]					
Odd	Even	Odd-I Even-IV	I-IV I-IV	IV I	II II	XV II-V	V V	III III	VI VI	VII VII	VIII VIII
Matched Factors											
I	IV	66									
I-IV	I-IV	58	76								
IV	I	28	61	80							
II	II	16	20	27	67						
XV	II-V	13	21	18	50	48					
V	V	11	13	00	18	32	51				
III	III	-01	-00	-00	07	05	12	78			
VI	VI	-08	-11	08	21	23	12	08	62		
VII	VII	13	10	21	16	16	13	06	13	00	
VIII	VIII	31	42	38	30	20	13	-04	04	16	43
Unmatched Factors											
XIV		03	06	23	20	20	06	07	05	13	18
	IX	38	45	37	25	15	06	07	07	24	27
XIII		11	07	03	07	06	12	04	07	02	05
	XIV	13	00	04	11	10	10	15	08	02	08
IX		17	15	08	00	15	16	13	10	00	00
	XIII	21	04	18	10	13	-01	00	06	10	13
XVII		10	17	13	12	06	17	06	05	03	00
	X	07	13	11	10	17	17	15	00	06	00

[a] Decimal points omitted.

[b] Scales based on items with loadings on two factors (e.g., I-IV, II-V) may be expected to correlate substantially with
scales based on items with loadings uniquely on one of the two factors. Underlined coefficients are for such relation-
ships.

CORRELATIONS[a] BETWEEN FACTOR SCALES (ODD-EVEN AVERAGED) AND RESIDUAL CONTENT SCALES

Residual Content Scales	Odd-I Even-IV	I-IV I-IV	IV I	I1 II	XV II-V	V V	III III	VI VI	VII VII	VIII VIII
	Factor Scales[b]									
Tactics (O)	27	27	21	20	03	08	03	03	13	12
Tactics (E)	1.	18	12	10	04	03	03	04	12	10
Life Science	35	33	22	15	13	13	05	01	03	28
Psychology	16	15	10	21	16	23	-02	06	10	16
Technical Service	45	50	31	13	14	18	-04	-03	11	05
Mathematics-Physics	20	39	52	17	14	12	06	07	14	23
History and Philosophy of Science	18	27	28	16	17	15	-03	07	11	1.
Games	03	06	03	05	04	07	03	03	25	04
Supply (O)	27	23	12	03	10	12	03	03	08	03
Supply (E)	25	24	13	03	11	20	03	-03	13	11
Art-Music-Entertainment	13	23	11	31	32	22	13	13	11	14
Literature	24	23	21	31	32	24	03	13	11	13
Finance	33	13	03	14	11	13	14	03	13	03
Politics	03	12	13	30	23	13	13	11		13
Socioeconomic	23	13	03	31	13	04	13	04	03	13
Quantitative Miscellany	03	13	13	13	13	13	03	13	03	14
Qualitative Miscellany	13	13	03	03	03	13	13	11	13	

[a] Decimal points omitted.

[b] Underlined values are correlations between content scales and factor scales drawing 5 or more items from given content.

Selection of Items for Final Scoring Scales

Based on the above findings, it was decided to assemble ten factor-based scales by combining matched odd-even scales. To provide greater length for five of the scales, item factor loadings and specific content were reviewed, and seven scales of 40 items, two scales of 25 items, and one scale of 10 items were assembled. The resultant scales are listed in Table 8.

The short Intellectual Games scale offers a note of interest. All five items from odd factor VII were about chess, while all three from even factor VII were about bridge. This accidental segregation led to low loadings on factor VII for the one odd item on bridge and the one even item on chess. Adding these two items to the combined scale may well have yielded a more reliable total scale score than would be expected from the coefficient of .22 between the two short factor VII scales.

Table 9 gives estimated reliability and intercorrelation of the final factor-based scales. Despite particular findings such as that on the Games scale, these estimates are based on the assumption that the unit reliability coefficients and intercorrelations for all scales would be the same as those shown in Tables 5 and 6.

Finally, Table 10 shows the selected residual content scales. Where there were too few items left in a given category, items in that category were combined with those of a category to which they appeared to be related on the basis of overall factor results and logic.

Table

TEN FINAL FACTOR SCALES

Factor Scales	Derivation	No. of Items	Range of Loadings	Reallocation of Items	
				Added	Deleted
Practical Skills	I_O, IV_E	4	.. -..	-----	-----
Technology Operations	$I\text{-}IV_{OE}$	4	.. -.4?	5 Technical Service	-----
Math-Physical Science	IV_O, I_E	4	.? -..	1 Math	1 Math
History-Politics	II_{OE}	4	.. -..	-----	-----
Literature-Arts	V_{OE}	4	.? -..	1 ea-Psychology, Art, Philosophy	1 ea-Technical, Finance, Quantitative Misc.
Entertainment-Culture	XV_O, $II\text{-}?_{OE}$	..	.. -..	1 Literature; 1 ea-Philosophy, Entertain, Politics, Qualitative Misc.	1 Tactics
Finance	III_{OE}	..	.. -..	1 Finance	1 Socioeconomic
Organized Sports	VI_{OE}	..	.. -..	5 Organized Sports	-----
Intellectual Games	VII_{OE}	..	.. -..	Games	-----
Biochemistry	$VIII_{OE}$	..	.. -..	Biology-Medicine; 1 ea-Tactics, Physics, Politics, Socio-economic, Qual. Misc.	-----

Table 4

ESTIMATED RELIABILITIES AND INTERCORRELATIONS
AMONG FINAL FACTOR SCALES[a]

Final Factor Scales

	PS	TO	MP	HP	LA	EC	FN	OS	IG	BC
Practical Skills (PS)	80									
Technology Operations (TO)	60	79								
Math and Physical Science (MP)	33	47	79							
History, Politics-Culture (HP)	19	74	71	86						
Literature and Arts (LA)	14	17	12	27	67					
Entertainment-Culture (EC)	25	25	25	59	42	71				
Finance (FN)	-01	-13	-12	05	14	07	70			
Organized Sports (OS)	-13	-14	03	20	13	43	13	75		
Intellectual Games (IG)	13	07	37	42	03	06	13	23	43	
Biochemistry (BC)	42	07	42	42	13	03	-10	02	27	68

[a] Decimal points omitted.

Table 10

FINAL RESIDUAL CONTENT SCALES

Scale	Content	Items Number	Items Total
Warfare	Tactics	43	43
Outdoors	Organized Sports	3	
	Nature Sports	4	12
	Farm Facts	5	
Life Science	Biomedical	4	16
	Psychology	12	
Technology	Technical Service	27	32
	Mechanical Information	5	
Math-Science	Physics	3	
	Chemistry	1	11
	Mathematics	7	
History-Literature	History and Philosophy of Science	7	12
	Literature	5	
Supply	Supply	44	44
Intell. Entertainment	Games	6	
	Art	5	17
	Music	3	
	Entertainment	3	
Finance	Finance	16	16
Political Science	Politics	12	12
Economic-Social	Socioeconomic	13	13
Quantitative Misc.	Quantitative Miscellany	14	14
Qualitative Misc.	Qualitative Miscellany	18	18
	Total		260

SUMMARY

To obtain relatively homogeneous and mutually independent scales for scoring the 600 items of the Differential Officer Battery information tests, two factor analyses, one using odd items, the other even, were performed on matrices of item intercorrelations. Seventeen principal axes factors in each analysis were rotated to simple structure by the varimax method. From each 17, 14 usable factor-based scales were derived. Matching of these scales by content categories of the items included and by scale intercorrelations demonstrated that the scales from each analysis matched well with scales from the other analysis. The paired scales were then assembled and some were augmented slightly to yield ten final factor-based scales embracing a total of 340 items. The remaining 260 items were assembled into 13 residual content scales.

Factor solutions based on the two samplings of related items showed high congruence in major dimensions. The ten factor scales were tentatively interpreted. All 23 final scales--10 factor and 13 residual content scales--are to be validated for officer performance criteria to determine whether they are differentially predictive of effectiveness in combat, technical, and administrative activities.

DOCUMENT CONTROL DATA - R & D

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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Deputy Chief of Staff for Personnel, DA Washington, D. C.

13. ABSTRACT Technical Research Note 203 reports on research completed in the initial phase of a comprehensive longitudinal program to predict officer performance in combat, technical, and administrative duties by psychological measures obtained at entry on active duty. In 1958 and again in 1962, an extensive battery of measures of officer leadership potential was administered to a large sample of officers. The 1962 input of 4000 officers, source of the sample used in the present study, took the Differential Officer Battery (DOB) in a two-day session at the beginning of attendance at Branch basic Officer courses. In a one-year follow-up, job performance and potential of these men were evaluated by supervisors and peers working closely with them. Some six months later, a selected 900-officer sample was evaluated in a three-day integrated simulation exercise staged at the Officer Evaluation Center (OEC). Lastly, in the period from Spring 1967 to Spring 1968, ratings on job performance in a combat theatre (Vietnam) or in combat-ready situations in Europe, Korea, or CONUS were obtained on those members of the 1962 input still on active duty.

Analysis being completed is concerned chiefly with means of scoring the predictor instruments. The present publication details the analysis of officer responses and formulation of scoring scales for the information tests of the DOB. For the information content of the test battery, a double analysis was performed and the results synthesized. Two equivalent sets of questions were formed from responses of a 900-officer sample to 600 questions. The 300 items in each set were analyzed. Ten matching factors were identified by the two parallel studies and 13 additional sets were assembled from the remaining questions--23 scoring scales in all--to be validated as predictors of officer performance. Basing scores on the double analysis should reduce the effect of chance in evaluating the predictive effectiveness of the scores.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
*Differential Officer Battery (DOB)						
Differential prediction of officer performance						
*Factor analysis						
*Predictor measures						
Psychometrics						
Performance evaluation-combat						
Psychological tests and techniques						
Military leadership-measures of						
*Equivalence analyses						
Development of scoring scales						
*Factor structure-assessment						
*Factor scales						